

**DEVELOPMENT OF NATURAL-POZZOLAN BASED
ALKALI ACTIVATED CONCRETE INCORPORATING
NANO-SILICA**

by

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**Thesis submitted in fulfilment of the
requirements for the degree of
Doctor of Philosophy**

January 2020

ACKNOWLEDGEMENT
IN THE NAME OF ALLAH, MOST GRACIOUS, MOST
MERCIFUL

All praise is due only to **ALLAH** subhana wa ta'aala, the sustainer of the worlds, the most compassionate, the most merciful for bestowing me patience, health and knowledge to complete this work successfully. May the peace and blessings of **Allah** Subhanahu wa ta'aala be upon Prophet Mohammed (Sal allahu alahi wa sallam), his household and companions.

My profound gratitude goes to the management of the Universiti Sains Malaysia for giving me the opportunity to pursue and complete my PhD degree. I sincerely thank the entire management of the School of Civil Engineering of the University for their support and providing the environment required to pursue advanced research. In addition, my unreserved appreciation goes to my main supervisor: Prof. Megat Azmi Megat Johari of the School of Civil Engineering for his invaluable support, guidance, and encouragement throughout the period of this research. Also, my heartfelt appreciation goes to my co-supervisor, Prof. Mohammed Maslehuddin of the Center for Engineering Research, Research Institute, King Fahd University of Petroleum and Minerals, for his constant encouragement, guidance and valuable time given to me in all the stages of this work. I would also like to offer special appreciation to my co-supervisor, Dr. Muhammed Kalimur Rahman of the Center for Engineering Research, Research Institute, King Fahd University of Petroleum and Minerals for his encouragement, guidance and constructive criticisms throughout the period of this work. Further, I

appreciate constant encouragement, guidance and support provided by Dr. Salami Babatunde Abiodun of the School of Civil Engineering, Universiti of Sains Malaysia. Special appreciation and thanks from the bottom of my heart to Mr. Elam for providing help throughout my experimental work without which, it would have been very difficult. I would also like to appreciate Mr. Barry, Mr. Hatim Dafallah Mohamed and Mr. Abdul Rasheed Mohammed of the Research Institute of King Fahd University of Petroleum and Minerals, Dhahran Saudi Arabia for their relentless support in conducting SEM and XRD analyses of my samples. Further, I appreciate the assistance rendered by the members of the Center of Excellence in Corrosion, specially, Dr Rami Sulaiman and Dr. Kumar for allowing me to use their equipment in conducting reinforcement corrosion monitoring and FTIR. Also, I would like to thank Dr. Moruf Olalekan Yusuf for encouraging me to register for doctoral program and to do this work. I would also like to thank examiners who have read, questioned and given valuable corrections to improve the thesis. Finally, my enormous appreciation goes to my mother and siblings for their prayers, love and encouragement throughout this work without which completion of this endeavor would not have been possible. Lastly, my special thanks and unreserved appreciation go to my wife and children for their love, patience and endurance throughout my PhD journey. To all well-wishers, I say, thank you and Jazaakumu LLAHU khaeran.

DEDICATED TO

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LIST OF ABBREVIATIONS

A:	Aluminosilicate,
AAB:	Alkali activated binder
AAC:	Alkali activated concrete
AAS:	Alkali Activated Slag
Ar:	Anorthite,
ASTM:	American Society for Testing of Materials
C/N-A-S-H:	Calcium/Sodium-Alumina Silicate Hydrate
C:	Calcite
CA:	Cristobalite alpha,
C-A-S-H:	Calcium-Alumina-Silicate-Hydrate
CE:	Counter Electrode
C-S-H:	Calcium Silicate Hydrate,
D:	Diopside,
EDS:	Energy Dispersive Spectroscope
FA:	Fly ash
Fr:	Forsterite,
FTIR:	Fourier Transform Infra-Red
G:	Gypsum,
GGBFS:	Ground granulated blast furnace slag
GHG:	Green House Gas
H:	Hematite
LOI:	Loss on Ignition
LPR:	Linear Polarization Resistance
LVDT:	Linear Variable Displacement Transducer
MIP:	Mercury Intrusion Porosimetry
N-A-S-H:	Sodium-Alumina-Silicate-Hydrate
NMR:	Nuclear Magnetic Resonance
NP:	Natural pozzolan
nSiO ₂ :	Nano-silica
OPC:	Ordinary Portland cement

P:	Portlandite Ca(OH)_2
P:	Phillipsite
POFA:	Palm oil fuel ash
Q:	Quartz
RE:	Reference Electrode
RF:	Radio Frequency
SCE:	Saturated Calomel Electrode
SCMs:	Supplementary cementitious materials
SEM:	Scanning Electron Microscope
SF:	Silica fume
SH:	Sodium hydroxide
SS:	Sodium silicate
TAA:	Total Alkaline Activator
VPV:	Volume of permeable voids
WE:	Working Electrode
XRD:	X-ray Diffraction
XRF:	X-Ray Fluorescence
Z:	Zeolite Y

LIST OF SYMBOLS

°	Degree
°/min	degrees/minute
°C	Degree Celcius
$\mu\text{A}/\text{cm}^2$	Micro ampere/centimeter square
μm	Micro-meter
cm^{-1}	Per centimeter
cm^3	Cubic centimeter
cps	Cycles per second
<i>gr</i>	Gram
gr/cm^3	gram/cubic centimeter
gr/mol	gram/mol
gr/cc	gram/cubic centimeter
Gt	Gigaton
h	Hour
kg/m^3	Kilogram per cubic meter
kN	Kilo Newton
kN/sec	Kilo Newton per second
kV	Kilo Volts
$\text{k}\Omega.\text{cm}^2$	Kilo ohm square centimeter
M	Molarity
m^2/gr	Square meter/gram
m^2/kg	Square meter/kilogram
m^2/s	Square meter/second
mA	Milli ampere